Peste des Petits Ruminants

Importance
Peste des petits ruminants (PPR) is an acute contagious disease of small ruminants, particularly goats. Clinical signs are similar to rinderpest in cattle and the two organisms are closely related. Clinical signs may include fever, necrotic stomatitis, gastroenteritis, and bronchopneumonia .

Etiology
Peste des petits ruminants virus (PPRV) is a paramyxovirus of the genus *Morbillivirus*. It is antigenically very similar to the rinderpest virus.

Species affected
Goats and sheep are the species primarily affected by peste des petits ruminants. Cattle and pigs can be infected, but show no clinical signs and do not transmit the disease to other animals. PPR has also been reported in a few wild ungulates and the American white-tailed deer is susceptible when experimentally infected.

Geographic distribution
Peste des petits ruminants occurs in Africa, the Middle East, and India.

Transmission
Transmission of PPRV requires close contact. The virus is present in ocular, nasal, and oral secretions as well as feces. Most infections occur through inhalation of aerosols from sneezing and coughing animals, though fomite transmission can also occur. Animals may be infectious during the incubation period, but there is no known carrier state.

Incubation period
The incubation period can range from 3 to10 days, 4-5 days being typical.

Clinical signs
Most cases of PPR are acute, with signs of a sudden fever that may last for 5-8 days before the animal either dies or begins to recover. Nonspecific signs include restlessness and a decreased appetite. The characteristic signs begin with a serous nasal discharge that becomes mucopurulent. The nasal discharge may remain mild or progress to a severe catarrhal exudate that crusts over, blocking the nostrils and causing respiratory distress. The nasal mucous membranes may develop small areas of necrosis. The conjunctiva may be congested with crusting on the medial canthus, and profuse catarrhal conjunctivitis with matted eyelids is often seen. Necrotic stomatitis is also common and can be severe. Concurrently, animals will most likely have profuse, non-hemorrhagic diarrhea resulting in severe dehydration, which may progress to emaciation, dyspnea, hypothermia, and death within 5-10 days. Bronchopneumonia with coughing is common late in the disease. Abortion may be seen in pregnant animals. A peracute form with higher mortality occurs frequently in goats. Subacute and chronic forms can occur with inconsistent signs developing over 10-15 days.

Post mortem lesions

The post mortem lesions are similar to rinderpest, with inflammatory and necrotic lesions in the oral cavity and throughout the gastrointestinal tract. The carcass is generally emaciated, with conjunctivitis and erosive stomatitis. Necrotic lesions may be seen on the inside surface of the lower lip and adjacent gum, commissures, and tongue. In severe cases, the hard palate, pharynx, and upper esophagus also have lesions. The rumen, reticulum, and omasum rarely have lesions, however, the abomasum may have outlined erosions that may bleed. In the small intestine, small streaks of hemorrhages and sometimes erosions can occur in the first portion of the duodenum and the terminal ileum. The Peyer's patches have extensive necrosis and, sometimes, severe ulceration. The most severe lesions are seen in the large intestine, with congestion around the ileo-cecal valve, at the ceco-colic junction, and in the rectum. "Zebra stripes" of congestion are often seen in the posterior part of the colon on the mucosal folds. Erosive lesions may also occur in the vulva and vaginal mucous membranes. Unlike rinderpest, the respiratory system is usually also affected. Respiratory lesions include small erosions and petechiae in the nasal mucosa, turbinates, larynx, and trachea. Bronchopneumonia with consolidation and atelectasis occurs frequently as well as pleuritis and sometimes hydrothorax. Congestion and enlargement of the spleen may be seen. The lymph nodes are generally congested, enlarged, and edematous.

Morbidity and Mortality

The morbidity and mortality rates can be up to 100% in severe outbreaks. In milder outbreaks, morbidity is still high but the mortality rate may be closer to 50%. Severity depends upon the susceptibility of the population. Goats are generally more susceptible to peste des petits ruminants than sheep. Certain breeds of goats are predisposed to infection.

Diagnosis

Clinical

Peste des petits ruminants should be considered in sheep or goats with any acutely febrile, highly contagious disease with oral erosions and/or gastrointestinal signs.

Differential diagnosis

Differentials include rinderpest, contagious caprine pleuropneumonia, bluetongue, pasteurellosis, contagious ecthyma, foot and mouth disease, heartwater, coccidiosis, and mineral poisoning. The case history, geographic location, and the combination of clinical signs can help to differentiate some of these diseases. Laboratory testing is important in confirming the diagnosis.

Laboratory tests

Tests used to identify the organism include antigen detection methods such as agar gel immunodiffusion, counter immunoelectrophoresis, indirect immunofluorescence, enzyme-linked immunosorbent assays (ELISA), and immunohistopathology. Virus isolation and identification can be done using primary lamb kidney cells or VERO cell lines, virus neutralization, and electron microscopy. Viral RNA can be detected with

PPR-specific cDNA probes or amplification by polymerase chain reaction (PCR). Serological tests include virus neutralization, competitive ELISA, counter immunoelectrophoresis, agar gel immunodiffusion, and immunodiffusion inhibition tests.

Samples to collect

Before collecting or sending any samples from animals with a suspected foreign animal disease, contact the AVIC. These samples should only be sent under secure conditions, by authorized personnel, and to authorized laboratories to prevent the spread of disease.

Samples include blood in EDTA, clotted blood or serum (paired serum samples taken 2 weeks apart if possible), swabs of nasal and lachrymal discharges, mesenteric lymph nodes, spleen, lung, tonsils, and sections of the ileum and large intestine. Samples should be shipped fresh on ice (not frozen) within 12 hours. It is important to collect samples in the acute phase of the disease when clinical signs are still evident.

Recommended actions if peste des petits ruminants is suspected

Notification of authorities

State and federal veterinarians should be immediately informed of any suspected cases of peste des petits ruminants. Federal: Area Veterinarians in Charge (AVICS)
http://www.aphis.usda.gov/vs/area_offices.htm
State vets: http://www.aphis.usda.gov/vs/sregs/official.html

Quarantine and Disinfection

The affected area should be quarantined and exposed or infected animals should be slaughtered and the carcasses burned or buried. The peste des petits ruminants virus can be killed by most common disinfectants (phenol, or sodium hydroxide 2% for 24 hours) as well as alcohol, ether, and detergents. It can survive for long periods of time in chilled or frozen tissues.

Public health

The peste des petits ruminants virus does not infect humans.

For More Information

World Organization for Animal Health (OIE)
http://www.oie.int

OIE Manual of Standards
http://www.oie.int/eng/normes/mmanual/a_summry.htm

OIE International Animal Health Code
http://www.oie.int/eng/normes/mcode/A_summry.htm

USAHA Foreign Animal Diseases book
http://www.vet.uga.edu/vpp/gray_book/FAD/

References

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"Peste des Petits Ruminants." In *The Merck Veterinary Manual*, 8th ed. Edited by S.E. Aiello and A. Mays. Whitehouse Station, NJ: Merck and Co., 1998, pp. 539-541.

Saliki, J. T. "Peste des Petits Ruminants." In *Foreign Animal Diseases.* Richmond, VA: United States Animal Health Association, 1998, pp. 344-352.

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